

Photonic crystals for applications in solar energy conversion

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Nanoparticles play important role in energy conversion since Grätzel and collaborators presented a high efficiency solar cell made from TiO_2 nanoparticles [1]. It has triggered a great effort to find cheap and easy methods [2] for photovoltaic energy conversion that could end up in a market product [3]. However, their performances are not optimum with top efficiency values below 12%.

Photonic crystal concept can provide new solutions to solar energy conversion as has recently been reported by Mallouk et al [4]. Here we report on the fabrication methods to achieve photoelectrochemical cells with inverse opal topology. We will report on the fabrication of inverse opals made from photoactive materials as TiO_2 , CeO_2 etc. We are interested to control optical properties of inverse colloidal crystals that would maximise photocarriers generation and, therefore, the device efficiency.

[1] M. Grätzel, *Nature*, **414**, 338, (2001).

[2] A. Corma *et al.* *Nature Mater.*, **3**, 394, (2004).

[3] *OptoLaser Europe*, Issue 120, Sept 2004, p. 25.

[4] T. E. Mallouk *et al.* *J. Am. Chem. Soc.*, **125**, 6306, (2003).